A Little Rain Each Day: Psychological Stress & Health Disparities

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Abstract

It seems that nearly every day a new study is published that links psychological stress to poor health outcomes. Psychological stress has been found to cause immunosuppression, increased susceptibility to infectious diseases, delayed wound healing, and to contribute to the development of psychological disorders. Yet, the implications of psychological stress as it relates to health disparities are seldom addressed. Chronic stress is an important but understudied factor that interacts with culture, socioeconomic status, and other psychosocial factors to act not only directly on physiological systems, but also to shape and influence health-related behavior. Research indicates that psychological stress acts through multiple pathways to influence health. Likewise, psychological stress and its impact on vulnerable populations may be addressed and managed at multiple levels. We define stress, and briefly review the literature on psychological stress in health disparities. We briefly describe several models of how stress negatively impacts health generally, and the pathways through which is believed to impact the health of some vulnerable populations specifically. We suggest ways in which policymakers, health systems, organizations, communities, and individuals can begin to work to reduce psychological stress and stress-related health inequities.

Keywords: Psychological stress, chronic stress, health, disparities

Introduction

> "A little rain each day will fill the rivers to overflowing."
>
> *Liberian Proverb*

Health disparities between racial and ethnic minorities and majority groups in the United States are issues of ever-growing public health concern. For example, African Americans fare more poorly than whites on many chronic disease outcomes including cardiovascular disease, and diabetes (Lackland & Keil, 1996). Diabetes among Native Americans occurs at shockingly high rates (CDC, 2002a). Some Latino groups in the U.S. have disturbingly high rates of many chronic diseases (Bazargan et al., 2005), and immigrant Asian women have the highest rates of suicide of any group in the U.S. (Vongs, 2003).

Disparities have been documented across the lifespan. For example, statistics indicate that some racial and ethnic minority groups fare worse than whites on infant mortality and pregnancy outcomes (Cooper, Cutler, Desvigne-Nickens, 2000), and the gap in life expectancy between African Americans and whites is between five and seven years (Eley, Hill, Chen, 1994). An extensive body of research exists that suggests that psychological stress is an important factor in chronic disease development, maintenance, and/or exacerbation, as well as in increased susceptibility to infectious disease (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Pawlak, Witte, & Heiken, 2003). Yet, psychological stress has seldom been studied as a major contributing factor in health disparities. A few scholars have discussed the role that psychological stress may have in disease processes as it relates to particular groups, but stress is still not factor that is at the forefront of discussions by those in the public health fields in relation to disparities. This is unfortunate as a greater understanding of and some solutions to such disparities may actually be found by looking at what we know about psychological

stress and the multiple pathways through which it acts to impact health and disease processes.

The key purpose of this paper is not to elucidate exactly how examination of psychological stress may reveal specific solutions to health disparities, but to increase awareness of the issue of stress as a contributor to disparities. Moreover, I hope to bring attention to novel ways to think about health disparities research and the potential promise that exploration of psychological stress, and the many pathways through which it acts, may hold for finding new routes through which to intervene to reduce disparities. These routes would be informed by a large body of existing research on stress and an in-depth knowledge of the ways in which psychological stress "gets under the skin" to affect health.

What is Stress?

Before discussing why stress is a significant factor in health disparities, it is important to take a moment to define it. According to Sapolsky (2004), what we typically refer to as "stress" actually consists of two components: stressors and the stress response. Stressors are the things that throw the body's physiological systems out of their ideal balance (homeostasis). Stressors can be either physical or psychological aspects of the external environment, or internal factors such as infection and anticipatory thoughts, such as worry. The stress response is the change that occurs in the body to put it back in balance and reestablish homeostasis. Sapolsky (2004) states "the stress-response can be mobilized not only in response to physical or psychological insults, but also in expectation of them" (p. 7) The stress response is frequently referred to as the "fight or flight response" in which an "alarm" is set off in the brain and the body prepares for defensive action. "The nervous system is aroused, hormones are released to sharpen the senses, quicken the pulse, deepen respiration, and tense the muscles" (NIOSH, 1999). Why should we care about stress? Cohen, Kessler and Gordon (1995) indicated that stressors may "tax or exceed the adaptive capacity of an organism, resulting in biological and physiological changes" which "may be detrimental and place the organism at risk for disease" (p. 3). Sapolsky (2004) concurs, stating that "with sufficient activation...the stress response can become more damaging than the stressor itself, especially when the stress is purely psychological. This is a critical concept, because it underlies the emergence of much stress-related disease" (p.13). Moreover, stress can be either acute (short term) or chronic (long term). An in depth discussion of the concept of stress is beyond the scope of this paper. A number of publications exist that describe in great detail how stress operates to contribute to the development of disease and illness (Cohen, Kessler, & Gordon, 1995; McKewen, 1998; Sapolsky, 2004).

Chronic Stress: A Little Rain Each Day

The notion that chronic psychological stress has a deleterious effect on mental and physical health is certainly not a new one and dates back to the 1930's when Selye first discussed the topic (Sapolsky, 2004). In fact, an enormous body of scholarly work exists that documents the relationship between psychological stress and health outcomes. In the quote that opens this paper, "a little rain each day" is an apt metaphor for the chronic psychological stress that impacts virtually everyone's daily lives. Indeed, it is chronic stress, "a little rain each day," as opposed to stressful major life events, that is frequently discussed as the type of stress that may be most harmful to health (Sapolsky, 2004). Chronic stress that is believed to have the greatest negative impact on health because under chronic stress "the body is in a constant state of activation: rate of wear and tear to biological systems increases and fatigue or damage results, and the body's ability to repair and defend itself compromised; risk of injury or disease escalates" (NIOSH, 1999). Under chronic stress, the body's adaptive capabilities may be exceeded: chronic stress "fill the rivers to overflowing."

Chronic psychological stress is believed to be a contributing factor in a number of illnesses and medical conditions including hypertension, cardiovascular disease (Williams, 1997), diabetes (Wales, 1995), obesity (Epel et al., 2000), asthma (Marshall & Agarwal, 2000), and cancer (Kiecolt-Glaser & Glaser, 1999). Further, stress has been found to cause

immunosuppression (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002), and increased susceptibility to infectious diseases. Stress has been implicated in triggering psychological disorders (Ardayfio & Kim, 2006) and may exacerbate a host of other illnesses and conditions (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). Psychological stress may also be a factor in health-damaging behaviors such as excessive alcohol consumption, low levels of physical activity, tobacco use (e.g., see Steptoe, et al., 1998), and risky sexual behaviors (Parrott, 1995).

Stress and Health Disparities in the United States

Why study psychological stress in relation to health disparities? Underserved groups in the U.S., including people of color and low income populations, may experience higher levels of chronic stress due to: racism and discrimination (Clark, Anderson, Clark, & Williams, 1999), lower average socioeconomic status (Williams, 1997), lower income levels and income inequality (Kawachi, Kennedy, Lochner, Prothrow-Stith, 1997), lower levels of education, greater job stress (e.g., low control; NIOSH, 1999), immigration-related stress if foreign-born, and factors related to ethnicity and culture (e.g., level of acculturation; Biafora, Warheit, & Zimmerman, 1993).

Socioeconomic-Related Health Disparities

While the research on the role of psychological stress in socioeconomic health disparities in the U.S. is sparse, a growing body of research has reported on how stress contributes to socioeconomic disparities, and perhaps constitutes the largest body of work on stress and health disparities. For example, Lantz, House, Mero, and Williams (2005) reported results from the "American's Changing Lives Study," a large (n=3, 617), multi-wave prospective study and found that stress was related to socioeconomic position. The results supported their hypothesis that differences by socioeconomic position in exposure to stress and stressful life events was one of the means by which socioeconomic health disparities were produced. An investigation conducted by Almeida, Neupert, Banks, and Serido (2005) sought to understand how the severity of daily stressors, as opposed to major life events, impacted socioeconomic health disparities. They examined data from 1,031 participants in the combined National Study of Daily Experiences and the Midlife in the United States Surveys, and found associations between the severity of daily stressors and socioeconomic status (as defined by educational level), with those with lower levels of education reporting more severe daily stressors than those with higher levels of education. Moreover, participants with less than a high school level of education evaluated stressors as posing greater financial and other types of risks. A study conducted by Sloan, Huang, Sidney, Liu, Williams, and Seeman (2005) took the next step and examined the actual physiological pathways through which stress may impact physical health and contribute to socioeconomic health disparities. They examined parasympathetic nervous system (PNS) activity in a sample of 756 young adult subjects in the CARDIA heart disease study. They cited research that indicates that psychosocial stressors can reduce cardiac parasympathetic regulation, as well as scholarly work that indicates that increasing social stress increases socioeconomic status disparities proportionally. Results from their study indicated that PNS regulation may indeed be a physiological mechanism that links stress associated with low SES to higher chronic disease morbidity and mortality. Taken together, the results of these studies exemplify how stress may be an important factor in socioeconomic health disparities in the U.S.

Racial/Ethnic Health Disparities

Another growing body of research has also begun to examine how psychological stress interacts with race and ethnicity to contribute to disparities. Becker, Israel, Schulz, Parker, and Klem (2005) conducted a study with predominantly low-income African American women (n = 679) residing on the east side of Detroit, and examined social contextual stressors in the neighborhood and health outcomes. They found that although contextual stress in fact had a consistently negative impact on health, perceived control in the face of stressors was a

buffer against the negative effects of stress for some participants. Tucker (2005) reported on an on-going cohort study that examined, among other issues, how stress and nutritional factors contributed to chronic disease disparities among Northeastern U.S.-dwelling Puerto Rican adults. Tucker discussed stress in the context of "allostatic load" a hypothesis that we will discuss in a bit more detail later in this paper. Tucker also discussed how immigration and acculturation-related stress could be important factors in the study population, and why identification of specific sources of stress will be crucial in this work. In a 2001 study, Schulz, Parker, Israel, and Fisher used a combination of qualitative and quantitative methods to identify factors that African American women raising children in an economically disenfranchised urban community in Detroit reported as being stressful. Stressors identified included disrespect or unfair treatment, work and finance related stress, family issues, stress related to safety, and stress related to municipal services, including police. Artinian, Washington, Flack, Hockman, and Jen (2006) examined the relationship between stress, depression and blood pressure among 245 hypertensive African American women. They found that the relationship between stress and diastolic blood pressure was mediated by depression, and the authors highlighted the importance of examining psychosocial and behavioral factors in research with hypertensive urban African-American women.

The brief descriptions presented here are by no means a comprehensive review of research on the role of stress in racial/ethnic health disparities, but simply a presentation of a few selected studies that illustrate how stress may be a factor in health disparities among these populations. Notably, much of the research we described on psychological stress and health disparities has examined African Americans. Indeed, the largest body of research in this area exists for African Americans. The literature on the relationship between psychological stress and health disparities for Native Americans, Hispanics, and Asian Americans is extremely scant. Clearly this represents an important gap in the stress-health disparities literature.

Theoretical Models: How Stress Affects Health

A number of models useful in understanding how psychological stress has an impact on health have been proposed. Although a thorough discussion of any one of these models is beyond the scope of this paper, I will briefly introduce several models that we believe may be of particular interest to public health researchers. Cardiovascular reactivity is one mechanism by which psychological stress may affect cardiovascular health. According to the "cardiovascular reactivity hypothesis," exaggerated cardiovascular responding to stress is a marker or mediator of the development of coronary heart disease and essential hypertension (Arthur & Katkin, 2006; Arthur, Katkin, & Mezzacappa, 2004; Kelsey, Soderlund, & Arthur, 2004; Krantz & Manuck, 1984). Cardiovascular reactivity is actually a key factor in another model that is of particular interest to people of color in the U.S., who bear a disproportionate burden of disease and chronic illness. Clark, Anderson, Clark, and Williams (1999) proposed a model in which racism is a stressor for African Americans. This model examines the psychological and physiological pathways through which racism acts to affect health outcomes. In the Clark et al. model, racism is considered a chronic stressor that significantly impacts the cardiovascular health of African Americans. Although the specific focus of the Clark et al. (1999) model is African Americans, future work may extend the model to other underserved populations. Indeed, recent research suggests that racism is a stressor for Asian Americans as well (Liang, Li, & Kim, 2004).

Perhaps the "hottest" stress model being discussed in relation to public health today is allostatic load. McEwen (1998) described allostasis as an essential component of maintaining the body's homeostasis. He described how stress resulted in allostatic load:

> "…when these adaptive systems are turned on and turned off again efficiently and not too frequently, the body is able to cope effectively with challenges that it might not otherwise survive. However, there are a

> number of circumstances in which allostatic systems may either be overstimulated or not perform normally, and this condition has been termed "allostatic load" or the price of adaptation…Allostatic load can lead to disease over long periods" (p. 33).

It is my hope that interest in allostatic load will be a catalyst for increased study of the role of psychological stress in health disparities. However to date, research focusing particularly on allostatic load and health disparities among racial and ethnic minority populations is still quite sparse.

Taylor, Repetti, and Seeman (1997) proposed a conceptual framework, based on an extensive review of the literature in psychosocial factors in health, that models interactions among environmental factors, chronic stress, mental health, coping strategies, health habits and use of services, and biological outcomes. Taylor et al. (1997) state that "the degree of chronic stress experienced by individuals is heavily influenced by the characteristics of their community" (p. 49). The list of conceptual models of stress and health presented here is by no means complete, but each of these models may be of use as a launching point for those who wish to explore the role of stress in health disparities further.

Stress, Mental Health and Health-Related Behaviors

A key aspect of the Taylor et al. framework is that it includes not only physical disease outcomes, but also mental health, coping strategies, and health habits. In terms of mental health, stress is implicated as a factor in a number of psychological disorders. For example, research suggests that stress may be an important factor in mood disorders such as depression (Ardayfio & Kim, 2006; Bale, 2006). Stress may contribute to an overall decrease in the mental heath status of many Black Americans (Anderson & McNeilly, 1991). Stress may also have an important role in anxiety disorders (Ardafayio & Kim, 2006; Kubzansky, & Arthur, 2004) and suicidal behavior (Vilhjalmsson, Kristjansdottir, & Sveinbjarnardottir, 1998).

As previously mentioned, health-related behaviors such as tobacco use or level of physical activity can be impacted by chronic stress (Steptoe, 1998). Indeed, research suggests that some health-damaging behaviors, such as alcohol abuse (Droomers, Schrijvers, Stronks K, van de Mheen, & Mackenbach, 1999), tobacco use (Parrott, 1995), risky sexual behavior (Mazzaferro et al., 2006), and overeating or unhealthy food choices (Solomon, 2001) may be attempts to cope with stress. Further, stress has been implicated in increased violence and aggression (Kassel, Stroud, & Paronis, 2003; Steptoe et al., 1998) and as a factor in self-neglect (Meurle-Hallberg & Armelius, 2006).

Addressing Disparities by Addressing Stress

Research indicates that psychological stress acts through multiple pathways to influence health (e.g., see Kiecolt-Glaser et al., 2002; Kelly, Hertzman, & Daniels, 1997). Likewise, the sources of psychological stress (stressors), as well as the impact of the stressors (the stress response), may be addressed and/or managed at multiple levels. We can employ a multi-level framework for intervention that addresses individual, familial, societal, heath policy-level, community, and organizational factors. Moreover, intervention can occur at multiple levels simultaneously.

Individual Level Strategies

Much of the work in the area of stress management has focused on individuals. These include relaxation therapy, meditation, yoga, problem solving, time management, etc. In terms of stress management programs for individuals, NIOSH (1999) reports that "…time management or relaxation exercises…may rapidly reduce stress symptoms; it also has the advantage of being inexpensive & easy to implement." Surprisingly, little research has been conducted that examines stress management in low-income communities of color. A few studies have shown that some "validated" stress management interventions had a positive impact on health outcomes for the African Americans who participated (Alexander et al., 1996; Castillo-Richmond et al., 2000), but this area has been virtually unexplored with respect to Hispanic Americans. Research exploring the

phenomenology of psychological stress among Asian America groups remains scant. Yet, post-traumatic stress disorder, depression, and suicide are disproportionately high in some segments of the Asian American population (Hinton, Chen, Du, & Tran, 1993; Shoen, Davis, Collins, 1997; Vongs, 2003). Furthermore, recent research highlighted the need to understand racism-related stress among Asian Americans (Liang, Li, & Kim, 2004). Studies in the area of stress and stress management are important because at the same time sources of psychological stress are being addressed at the societal and community levels (Mays, 1995), it makes sense to provide individuals with tools to combat the harmful effects of stress on their health and quality of life. Research has indicated that appropriately framed and targeted health messages can significantly impact positive health behaviors in some underserved populations (Schneider et al., 2001).

Community Level Strategies

Opportunity is ripe for addressing stress at the community level. For example, REACH (Racial & Ethnic Approaches to Community Health) 2010 "supports community coalitions in designing, implementing, and evaluating community-driven strategies to eliminate health disparities" (CDC, 2002b). Indeed, the Nashville Reach 2010 Action Plan includes a mandate to examine psychological and behavioral barriers to health-related change. This would be a perfect opportunity to improve understanding of how community-related stressors, such as those that studied by Becker, Israel, Schulz, Parker, and Klem (2005) in their study of women in urban Detroit, impact health.

Organizational Level Strategies

Organizations such as the National Institute for Occupational Safety and Health (NIOSH) have developed strategies to address stress in employment settings (NIOSH, 1999). Although some of the strategies are individual level, i.e., stress management, others are designed to impact the organization, such as giving workers more control over their jobs.

Health System Level Strategies

One example of a strategy to address stress at the health systems level is to integrate stress management (and other behavioral counseling) into routine medical care. The Center for the Advancement of Health (2001) indicates in their document entitled "Health Behavior Change in Managed Care" that counseling to assist patients in reducing health risks is not typically a part of routine medical care, but that such counseling has significant potential benefits. Stress management could easily be included as part of any such counseling.

Policy Level Strategies

Strategies at the policy level to address stress include addressing provision of culturally-appropriate mental health services. Topics of focus include "Mental Health Parity" and increasing the number of mental health clinicians from underserved groups to provide treatment. Indeed, this was one of the recommendations of the President's New Freedom Commission on Mental Health, Subcommittee on Cultural Competence (2003). This committee stated the need to encourage governmental organizations, colleges, universities, associations, and advocacy groups to develop and implement plans to address the workforce inadequacies in mental health services for racial/ethnic populations. Policy level strategies could also address stressors in the physical environment, such as pollution and housing for low-income individuals and families. Indeed, the CDC (2002a) reports that stress is being examined as a key factor in how social determinants of health work.

Conclusions and Future Directions

The introduction of the issue of psychological stress into U.S. health disparities research and intervention may be seen by some as further complication of already complex issues. However, given the potential importance of psychological stress in disparities, the new opportunities afforded for insight into health and disease processes among underserved populations in the U.S. should be viewed with optimism. This line of research begins to tease apart the factors that may underlie some health disparities and reveal the pathways through

which they operate to negatively impact health in underserved populations. Additional avenues for research seem nearly unlimited. These new inquiries may reveal some solutions for disparities not seen in other disparities research.

In a document entitled "Who Will Keep the Public Healthy? Educating Public Health Professionals for the 21st Century" (IOM, 2002) the Institute of Medicine stated that "Public health professionals must have a framework for action and an understanding of the forces that impact on health, a model of health that emphasizes the linkages and relationships among multiple determinants affecting health. Such an ecological model is key to effectively addressing the challenges of the 21st century" (p. 1). Models that examine the linkages between psychological stress and other health-related factors, such as the Taylor, Repetti, and Seeman (1997) model, may be just the type of ecological model called for by the IOM.

Although stress is increasingly recognized as an important issue in disparities, particularly within the framework of the concept of allostatic load, the study of psychological stress in relation to disparities does not seem to have "caught on" the way other disparities related issues have. This may be due in part to perceptions that "stress management" is something in the purview of clinical psychologists or mental health professionals who are frequently viewed as having a more individual-level approach versus a public health approach. It should be reemphasized, however, that many of the studies we have mentioned have examined stress in relation to issues such as neighborhood context, socioeconomic issues, acculturation, and racism – all factors that may be addressed at levels beyond the individual. This is important because it takes the intervention to reduce stress out of the clinical office only and into the public health arena where the issues can be examined by a multitude of public health researchers and others who have an interest in reducing disparities. Again, stress and its sources may be addressed on multiple levels simultaneously. This is an area that is wide open and ripe for study on a broad range of health-related topics. The time has come for the widespread study and addressing of psychological stress as a major factor in U.S. health disparities.

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